CHEMICAL FORGERIES.

When on one occasion M. Dumas the elder was in the witness-box he was asked in the usual manner his name and profession. "My name," said he, "is Dumas, and were I not in the birthplace of Corneille I should call myself dramatic author." "Good," said the judge, "you know there are degrees." The quaint remark of the judge, although meant for satire, applies to all things, including, therefore, the skill of the forger and the alterer of manuscripts. From the powers of Lucas, who forged manuscripts of Newton and Pascal so cleverly as to deceive one of the first intellects in France, to the wretched clerk, who by an obvious process converts a cheque for £9 into one for £90, there are many "degrees." Grateful as we all feel to the resolute band of workers who have raised the science of chemistry to its present state we cannot but feel regret that its aid should be invoked by the criminal classes. As a matter of fact, the forger of the present day is as much ahead of his predecessors as the chemist or physicist. Let us glance for a moment at the *modus operandi* of the forger of 40 or 50 years ago, and compare it with that of his successors who now carry on the same hazardous "profession." We may do so without fear, as we shall show presently, that science has now been in her turn invoked by the other side, and so successfully that we may regard the part of the cheque forger, at all events, as "played out." Forty years ago the forger considered himself sufficiently equipped if armed only with a quill pen and two bottles, one containing a solution of oxalic acid and the other a solution of bleaching powder. With his quill in his right hand and a piece of blotting paper in his left he dexterously touches up the writing to be defaced with one of the two chemicals; having, by previous experiment, ascertained which to select. As he touches he notices with care the instant at which the writing disappears, and he then immediately applies the blotting-paper to absorb the excess. This style of manipulating is technically known by the adepts as the "local application." But so archaic a method of working upon cheques was not difficult to prevent; and, in fact, was put a stop to many years ago by incorporating in the cheque paper ferrocyanide of potassium or manganese, or these salts were introduced into the ink with which the cheque was printed. The forger then found it necessary to improve his chemical education. During the time necessary for this there was, of course, a lull in cheque forging. The studies to which we have alluded led the forger to the discovery that cyanide of potassium would get over the difficulty, and cheques were again frequently altered by the operator still adhering to "local application." The cheque printer then commenced the use of vegetable colours, and applied them to the paper with the aid of a watery medium. This sorely puzzled the forger for a time, the colours being easily destroyed or altered by the chemicals he employed, as, however skilfully he used the "local application," the colour in the neighbourhood of the letters to be removed underwent alteration. After a further course of study he adopted the following plan—The cheque to be operated upon was saturated with melted paraffin wax, and, after being allowed to cool, the paraffin immediately over the letters to be destroyed was removed with the aid of a fine "style," or pencil-shaped piece of steel, and the place was carefully cleansed from any remaining paraffin by the aid of bisulphide of carbon or benzole. The entire cheque was then immersed in a chemical solution capable of removing the writing ink. This having been accomplished, it became necessary to remove the remainder of the paraffin, which was done by soaking the cheque in bisulphide of carbon or benzole. The process we have described was in its turn put an end to by printing the cheques with fine lettering on paper impregnated with ferrocyanide of potassium and tannic acid. In fact, the "local application" is at best but a clumsy method of working with any document pretending to security, as there is always a sufficient difference of appearance between the touched and untouched portions to attract the attention of any vigilant or clear-sighted bank clerk. On holding a cheque thus altered between the eye and the light it will appear more or less blotched; and, moreover, scratches will be seen, caused by the use of the instrument in removing the paraffin. Several failures having occurred in the negotiation of documents which had been subjected to the operations last described our typical forger had again to resume his studies. After a time he was able to enunciate three propositions upon which he proposed to found a new method of working. These propositions were as follow:—Firstly, ink is a substance easily removable from paper; secondly, all substances are soluble in something; and, thirdly, all soluble substances are insoluble in some media. Our forger, then, after maturely digesting these principles, decided upon abandoning for ever his long-cherished system of "local application." He next proceeded upon covering those parts of the document which were to remain with Indian ink or any other substance capable of preserving them from the action of the chemicals to be subsequently applied. He then immersed the cheque bodily into a solution containing mordants to fix the colouring matters. After the unprotected ink was extracted the cheque was re-sized and, if necessary, re-glazed. At times it became necessary to soak the cheque in the two solutions before complete extraction was effected. With the view of baffling the scientific forger, papers tinted with fugitive colouring matters have been employed, but our forger, having good eyes, and being familiar with dyeing materials, soon found out the way to restore the paper to its original tint. We have heard, on good authority, that a cheque recently introduced requires a solution which contains no less than four acids and five bases, all of which are necessary for the preservation of the tints of the document, a pretty clear indication of the amount of science and skill possessed by the modern forger! The outlook for bankers would be gloomy indeed were it not that the resources of science are unlimited, and we are glad to find that a talented chemist, Mr. A. Anthony Nesbit, F.C.S., has patented an invention which will oblige our forger to seek fresh fields for his energies, as the cheques printed by his method are absolutely unalterable; in fact, this chemist, who has devoted years to study in order to baffle the forger, and consequently is familiar with all the methods of alteration, is unable himself to alter one of his own cheques. His process, although perfect, is very simple. It must be remembered that to remove ink it is necessary to employ solutions which are either slightly acid or alkaline. He therefore prints the cheques with a dye which is affected by both acids and alkalies, but which is one colour in acids and another in alkalies, and he prints his cheque partly with an acid and partly with an alkaline ink. If our forger treats the cheque with dilute acid the whole acquires the acid tint, and the printed inscription is lost; and if, thus baffled, he endeavours to repair his error by using an alkaline solution the whole cheque becomes of the alkaline tint, and consequently the original colour of the inscription is not restored. The same phenomena occur in inverse order if the alkaline solution be used first and the acid afterwards. Even if our forger were to discover a perfectly neutral solution capable of removing writing ink—a discovery by the way very unlikely ever to be made—he would not have advanced a step, for according to Mr. Nesbit's invention it would merely be necessary to have the acid part stronger than the alkaline, or *vice versâ*, and the immersion in a neutral solution would effect such complete blurring of the cheque as to render it entirely useless. As oxalic acid may be used with the ink, and as that acid does not affect type metal, the invention is applicable to almost all varieties of printing. Bicarbonate of soda can be employed as the alkali, thus ensuring entire freedom from injury to the metallic plates used in certain methods of printing. Moreover, as bicarbonate of soda is not affected by the carbonic acid of the air, and as the oxalic acid can be used of any strength, and can be covered by a vehicle impervious to air, although perfectly soluble, there is no possibility of any atmospheric action on cheques printed by Mr. Nesbit's process. Should the forger fall back on his old device of "local application" the chemicals used to prevent that method of alteration can still be employed, and, if desired, this new invention can be used in conjunction with nearly all the so-called "secure papers." We congratulate Mr. Nesbit on his discovery, and trust that other chemists will follow his example in applying their knowledge to the prevention and detection of crime.